

Listing of Claims

IN THE CLAIMS:

The following listing of claims is intended to supercede all previously filed listings of claims. Changes are shown with deletions in ~~striketrough~~ and additions underlined.

Claim 1 (Currently Amended). An object detection system for detecting and identifying targets, including:

a first module having a plurality of acoustic transmitters configured to generate a concatenated ultrasonic waves wavetrain including a first waveform configured to illuminate a target moving at a first speed and a second waveform configured to illuminate a target either moving at a second speed substantially slower than the first speed or being stationary, the wavetrain being transmitted in air and in a predetermined direction;

a second module having at least one acoustic receiver configured to receive reflected ultrasonic waves originating from the first module after reflection from a target; and

target identification logic coupled to the second module and configured to generate an output representative of the target.

Claim 2 (Original). The detection system of claim 1, wherein the first module includes a plurality of acoustic transmitters and the second module includes a plurality of acoustic receivers.

Claim 3 (Original). The object detection system of claim 2, wherein:

the acoustic transmitters are positioned in a generally collinear configuration oriented in a first direction;

the acoustic receivers are positioned in a generally collinear configuration oriented in a second direction;

the first direction and the second direction are nonparallel to one another.

Claim 4 (Original). The object detection system of claim 3, wherein the first direction is

substantially perpendicular to the second direction.

Claim 5 (Original). The object detection system of claim 1, wherein the target identification logic is configured to reduce background noise in the generated output.

Claim 6 (Original). The object detection system of claim 1, wherein the target identification logic is configured to reduce reverberation in the generated output.

Claim 7 (Original). The object detection system of claim 1, wherein the first and second modules are configured to minimize energy received at the second module from directions other than a predetermined direction targeted by the transmitter.

Claim 8 (Original). The object detection system of claim 1, wherein the second module includes at least a first said acoustic receiver and a second said acoustic receiver wherein the first said acoustic receiver is positioned above the second said acoustic receiver.

Claim 9 (Original). The object detection system of claim 1, further including feature extract logic configured to generate signals representative of at least one physical characteristic of the target.

Claim 10 (Original). The object detection system of claim 1, wherein the first and second modules are configured to reduce energy from directions other than a predetermined direction targeted by the transmitter.

Claim 11 (Original). The object detection system of claim 1, further including logic configured to identify targets based upon clusters derived from the reflected acoustic waves.

Claim 12 (Original). The object detection system of claim 1, wherein the produced ultrasonic waves include concatenated waves of different types.

Claim 13 (Currently Amended). The object detection system of claim 12, wherein the ~~interpretation~~ identification logic is configured to reduce reverberation in the generated output.

Claim 14 (Original). The object detection system of claim 12, wherein the first and second modules are configured to minimize energy received at the second module from directions other than a predetermined direction targeted by the transmitter.

Claim 15 (Original). The object detection system of claim 12, further including logic configured to correlate data of multiple pings to improve the received data.

Claim 16 (Currently Amended). The object detection system of claim 12, wherein the ~~interpretation~~ identification logic is configured to provide cluster analysis of over-resolved echo return from a single object.

Claim 17 (Currently Amended). An area detection system including a plurality of object detection systems for detecting and identifying targets, each object detection system including:
a first module having a plurality of acoustic transmitters configured to generate a concatenated ultrasonic waves wavetrain including a first waveform configured to illuminate a target moving at a first speed and a second waveform configured to illuminate a target either moving at a second speed that is substantially slower than the first speed or being stationary, the wavetrain being transmitted in air and in a predetermined direction;

a second module having at least one acoustic receiver configured to receive reflected ultrasonic waves originating from the first module after reflection from a target; and

target identification logic coupled to the second module and configured to generate an output representative of the target.

Claim 18 (Currently Amended). The area detection system of claim 2017, wherein the

generated ultrasonic waves from the respective object detection systems are configured to substantially overlay at a predetermined stand-off range.

Claim 19 (Currently Amended). The area detection system of claim ~~20~~ 17, further including integration logic configured to receive the generated outputs from each of the object detection systems and to generate an integrated output representing targets in a predetermined area.

Claim 20 (Currently Amended). The area detection system of claim ~~22~~ 19, wherein the integrated logic is configured to eliminate multiple representations of generated ultrasonic waves reflected from a single target.

Claim 21 (Currently Amended). An object detection system including:

(a) a first module having a plurality of acoustic transmitters configured to generate a concatenated ultrasonic waves wavetrain including a first waveform configured to illuminate a target moving at a first speed and a second waveform configured to illuminate a target either moving at a second speed substantially slower than the first speed or being stationary, the wavetrain being transmitted in air and in a predetermined direction;

(b) a second module having a plurality of receivers configured to receive reflected ultrasonic waves originating from the first module after reflection from a target;

(c) first logic configured to identify targets based upon clusters derived from reflected acoustic waves;

(d) second logic configured to minimize energy received at the second module from directions other than a predetermined direction targeted by the transmitter; and

(e) third logic configured to generate signals representative of at least one physical characteristic of the target and

wherein the acoustic transmitters are positioned in a generally collinear configuration oriented in a first direction;

wherein the acoustic receivers are positioned in a generally collinear configuration oriented in a second direction which is substantially perpendicular to the first direction.

Claim 22 (Currently Amended). A method of acoustically detection objects, the steps including:

generating a concatenated ultrasonic waves wavetrain including a first waveform configured to illuminate a target moving at a first speed and a second waveform configured to illuminate target either moving at a second speed that is substantially slower than the first speed or being stationary, the wavetrain being transmitted in air and in a predetermined direction;

transmitting the generated ultrasonic waves through air towards a target;

receiving ultrasonic waveforms from a set of at least one acoustic receiver configured to receive reflected ultrasonic waves originating from the first module after reflection from the target; and

processing ultrasonic waveforms with target identification logic coupled to the at least one acoustic receiver and configured to generate an output representative of the target.

Claim 23 (Original). The method of claim 22, further comprising the steps of:

determining whether the received ultrasonic waves are false alarms.

Claim 24 (Currently Amended). The method of claim ~~21~~22, wherein the ultrasonic waves are received by an array of receivers.

Claim 25 (Currently Amended). The method of claim ~~21~~22, wherein the ultrasonic waves are generated by an array of transducers.

Claim 26 (Currently Amended). The method of claim ~~21~~22, wherein the ultrasonic waves are generated by a single transducer.

Claim 27 (Original). The method of claim 22, wherein the step of classifying the received ultrasonic waves includes identifying targets based upon clusters derived from reflected acoustic waves.